

# Melissa Emory

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## Academic Positions

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| Assistant Professor, Oklahoma State University | August 2022 - Present           |
| NSF Postdoctoral Fellow, University of Toronto | July 2020 - August 2022         |
| University of Toronto, Postdoctoral Fellow     | July 2018 - June 2020           |
| Kyoto University, JSPS Fellowship              | May 2019 - August 2019          |
| MSRI Research Member                           | July 22, 2019 - August 02, 2019 |

## Education

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|---|----------|
| University of Missouri, Ph.D., mathematics<br>Thesis advisor: Shuichiro Takeda<br>Thesis title: On the global Gan-Gross-Prasad conjecture for general spin groups | May 2018 |
| University of Nebraska, M.A., mathematics   | May 2013 |
| University of Nebraska at Omaha, B.S., mathematics<br><i>magna cum laude</i> , with honors  | May 2011 |

## Research Interests

Automorphic forms and representations, number theory, representation theory

## Publications and Preprints

- “A multiplicity one theorem for general spin groups: the Archimedean case”, joint with A.Maiti and Y. Kim, *submitted* Preprint arXiv:2409.09320.
- “Beyond Endoscopy via Poisson Summation for  $GL(2, K)$ ”, with M. Espinosa-Lara, D. Kundu, and T. Wong, *submitted* Preprint arXiv:2404.10139.
- “Nondegeneracy and Sato-Tate distributions of two families of Jacobian varieties”, with H. Goodson, *submitted* Preprint arXiv:2401.06208 .
- “Contragredients and a multiplicity one theorem for general spin groups”, with S. Takeda (2023) *Math Zet.* Preprint arXiv:1901.01746
- “Sato-Tate distributions of  $y^2 = x^p - 1$  and  $y^2 = x^{2p} - 1$ ”, with H. Goodson, *J. Algebra* (2022), doi.org.10.1016/j.jalgebra.2022.01.002
- “Towards the Sato-Tate groups of trinomial hyperelliptic curves”, with H. Goodson and A. Peyrot *International Journal of Number Theory*, (April 2021), 2175-2206 DOI 10.1142/S1793042121500822. Preprint arXiv:1812.00242 (32 pp).
- “On the global Gan-Gross-Prasad conjecture for general spin groups”, *Pacific Journal of Mathematics* 306-1 (2020), 115–151. DOI 10.2140/pjm.2020.306.115. Preprint arXiv:2104.04814.
- “The Diophantine equations  $x^4 + y^4 = D^2 z^4$  in quadratic fields”, *Integers* **12** (2012), article A65 (08 pp).

## Grants

- NSF grant DMS 2347097 (co-PI's M. Asgari and M. Fox) to support the 14th meeting of the conference series *Texas-Oklahoma Representations and Automorphic Forms (TORA)*, Oklahoma State University, March 2025.  
Funds awarded: \$20,000.
- NSF grant DMS 2401444 (co-PI's J. Cohen, K. Klinger-Logan, and L. Yang) to support the *36th Workshop on Automorphic Forms and Related Topics (AFW)*, Oklahoma State University, May 2024.  
Funds awarded: \$24,800.
- Number Theory Foundation grant (co-PI's J. Cohen, K. Klinger-Logan, and L. Yang) to support the *36th Workshop on Automorphic Forms and Related Topics (AFW)*, Oklahoma State University, May 2024.  
Funds awarded: \$3,000.
- Women for OSU, Partnering for Impact Grant to support the 2nd *Sonia Kovalevsky Day - Math Workshop*, Oklahoma State University, Spring 2025.  
Funds awarded: \$3,000.
- OSU College of Arts and Sciences Travel Award to support travel to attend the conference *Representation theory of p-adic groups* in Oberwolfach, Germany in December 2024.  
Funds awarded: \$1,200.
- NSF grant DMS 2002085 to support my postdoctoral research fellowship on *Beyond Endoscopy, Representation Theory, and the Generalized Sato-Tate Conjecture*. The host institution for the fellowship was University of Toronto and the sponsoring scientist was James Arthur, 2020-2022.  
Funds awarded: \$150,000.
- AMS-Simons Travel Grant to support travel, University of Toronto and Oklahoma State University, July 2019 - June 2023.  
Funds awarded: \$4,000.

## Honors and Awards

- Early Career Invited Lecture Award, University of British Columbia March 2021
- The Blumenthal Prize, MU Department of Mathematics May 2018
- AWM and AMS Graduate Student Travel award (\$1,000.00) January 2018
- John D. Bies International Travel Award (\$1,200.00) , University of Missouri 2017-2018
- Outstanding Community Service Award, MU Department of Mathematics (x 2) 2016-2018
- Miller Scholarship, MU Department of Mathematics 2013-2014
- NASA Nebraska Space Grant Fellow (Research Fellowship) 2010, 2013
- Outstanding Mathematics Award, University of Nebraska at Omaha 2010-2011
- James Earl Scholarship, UNO Department of Mathematics 2009-2011
- National Science Foundation Step Recipient 2008-2009

## Student Advising

- Currently advising senior honors thesis student Izik Pfirmann (due to graduate OSU in Spring 2025) on Symmetries of Root Systems and Lie Algebras.
- Advised senior honors thesis student Jensen Bridges (graduated from OSU in Spring 2024).  
Title of thesis: *Statistics on Cyclic Permutations Avoiding Two Patterns*
- Advised senior honors thesis student Kehan Bi (graduated from the University of Missouri in Spring 2018).  
Title of thesis: *The Diophantine Equation  $x^4 + D^2y^4 = z^4$  in Quadratic Fields.*

## Talks

- *Number Theory Seminar*, Johns Hopkins University, Baltimore, MD November 2024
- *Front Range Number Theory Conference*, Plenary Speaker October 2024  
Colorado State University
- *Number Theory/Algebra Seminar*, University of Texas Grand Rio October 2024
- *AMS Special Session on Automorphic Forms and the Langlands Program* April 2024  
Howard University, Washington DC
- *The Graduate Center Arithmetic Geometry Seminar*, CUNY April 2024
- *Southern Regional Number Theory Conference*, Louisiana State University March 2024
- *Number Theory Seminar*, Oklahoma State University November 2023
- *Automorphic forms, their arithmetic, and their applications*, October 2023  
2023 Fall Central Sectional Meeting, Creighton University, NE
- *AMS Special Session on Automorphic Forms and L Function*, September 2023  
2023 Fall Eastern Sectional Meeting, University of Buffalo, NY
- *AMS Special Session on Homological Aspects of p-adic Groups and Automorphic Representations*, University of Buffalo, NY September 2023
- *New Connections between Physics and Number Theory*, Pollica, Italy June 2023
- *35th Automorphic Forms Workshop*, Baton Rouge, LA, May 2023
- *Number Theory Seminar*, Kansas State University February 2023
- *Joint Mathematics Meeting*, Boston MA January 2023  
AMS Special Session on Automorphic Forms and Representation Theory
- *Joint Mathematics Meeting*, Boston MA January 2023  
AMS Special Session on Women in Automorphic Forms
- *Number Theory Seminar*, University of British Columbia October 2022
- *Association for Women in Mathematics*, Undergraduate Student Talk, OSU October 2022
- *Lie Groups Seminar (2 talks)*, Oklahoma State University September 2022
- *Number Theory Seminar*, Oklahoma State University, September 2022
- *Community-building in the Langlands program*, University of Bonn August 2022
- *AWM Research Symposium, Session: New Directions in Number Theory* June 2022  
University of Minnesota
- *ESI workshop: Minimal Representations and Theta Correspondence* April 2022
- *AMS Spring Central Sectional Meeting: Recent Developments of Automorphic Groups and Representations of p-adic groups* (online) March 2022
- *Midwest Representation Theory Conference*, University of Michigan March 2022
- *University of Toronto Number/Representation Theory seminar* February 2, 2022
- *Duke University Number Theory seminar* December 1, 2021
- *Midwest Representation Theory conference* (tentative) November 12 - 14, 2021
- *Florida State University, Algebra and Its Applications*, “Beyond Endoscopy” April 2021
- *University of British Columbia, Department of Mathematics Colloquium* March 2021
- *AMS Spring Eastern Sectional Meeting* (online, formerly at Brown University) March 2021
- *Florida State University, Algebra and Its Applications Seminar* February 2021
- *University of Nebraska at Omaha, Department of Mathematics Colloquium* January 2021  
“The Langlands Program: A Grand Unified Theory”
- *University of Arizona, Algebra and Number Theory Seminar* November 2020
- *University of Oregon, Number Theory Seminar* November 2020
- *University of California Los Angeles, Number Theory Seminar* October 2020
- *Association for Women in Math Lectures*, University of Toronto March 2020
- *Boston College, Number Theory and Algebraic Geometry Seminar* November 2019
- *University of Toronto, Number Theory and Representation Theory Seminar* October 2020  
February 2019, October 2019
- *AMS Sectional Meeting*, University of Wisconsin September 2019  
Special Session on Automorphic Forms and L-functions
- *Hokuriku University, Number Theory Seminar* July 2019
- *Kyoto University, Number Theory Seminar* May 2019
- *AMS Sectional Meeting*, University of Hawaii at Manoa March 2019  
Special Session on Recent Developments in Automorphic Forms
- *University of Waterloo, Canada, Number Theory Seminar* October 2018
- *AMS Sectional Meeting*, University of Michigan October 2018

- Representations of Reductive Groups over Local Fields and Related Topics
- University of Toronto, GANITA Lab Seminar June 2018
  - Canadian Number Theory Association Conference XV June 2018
  - Purdue University, Automorphic Forms and Representation Theory Seminar April 2018
  - Tufts University, 32nd Automorphic Forms Workshop March 2018
  - Joint Math Meetings, San Diego, CA January 2018
  - Association for Women in Mathematics Workshop, San Diego, CA (poster) January 2018
  - University of Missouri, Number Theory Seminar March, May, Oct. 2016
  - University of Missouri, Graduate Student Seminar Oct. 2014, April 2016
  - Midwest Number Theory Conference for Graduate Students and Recent PhDs IX, University of Illinois at Urbana-Champaign October 2012
  - MAA Sectional Meeting, Fremont Nebraska March 2012
  - Pi Mu Epsilon National Conference, Pittsburgh PA August 2010
  - Nebraska Conference for Undergraduate Women in Mathematics January 2010

### Conferences and Workshops Attended

- *Front Range Number Theory Days*, Colorado State University, October 2024
- *AMS Special Session: L-Functions and Automorphic Forms*, San Antonio, TX September 2024
- *36th Automorphic Forms Workshop*, Oklahoma State University, May 2024
- *TORA XIII*, University of North Texas, April 2024
- *Southern Regional Number Theory Conference*, Louisiana State University, March 2024
- *Analytic, arithmetic, and geometric aspects of automorphic forms*, American Institute of Mathematics, Pasadena, California, January 2024
- *Arthur packets*, BIRS-IASM Workshop, November, 2023.
- *TORA XII*, University of Oklahoma, October 2023
- *New Connections between Physics and Number Theory*, Pollica, Italy June 2023
- *35th Automorphic Forms Workshop*, Baton Rouge, LA, May 2023
- *Beyond Endoscopy Mini Conference*, the Fields Institute, April 2023
- *Joint Mathematics Meetings*, Boston MA, January 2023
- *Community-building in the Langlands program: University of Bonn*, August 2022
- *AWM Research Symposium, Session: New Directions in Number Theory* University of Minnesota, June 2022
- *ESI workshop: Minimal Representations and Theta Correspondence*, April 2022
- *Midwest Representation Theory Conference* University of Michigan, March 2022
- *Periods, Functoriality, and L-functions*, CIRM (online) January 2022
- *Relative Aspects of the Langlands Program, L-Functions and Beyond Endoscopy Aspects relatifs du programme de Langlands, fonctions-L et beyond endoscopy*, CIRM, (online) May 2021
- *Cross Atlantic Representation Theory and Other topics Online conference*, May 2020
- *New Developments in Representation Theory of  $p$ -adic Groups*, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, October 2019
- *On the Langlands Program: Endoscopy and Beyond*, National University of Singapore (partially funded participant) December 2018 - January 2019
- *Sixth Abel Conference: A Mathematical Celebration of Robert P. Langlands*, Institute for Mathematics and its Applications, November 2018 (funded participant)
- *Communicating Mathematics Effectively*, University of Washington, June 2018 (funded participant)
- *Women in Mathematics Symposium*, Purdue University, April 2018 (funded participant)
- *32nd Automorphic Forms Workshop*, Tufts University, March 2018 (funded participant)
- *Joint Math Meetings*, San Diego, CA, January 2018 (funded AWM participant)
- *Functoriality and the Trace Formula*, American Institute of Mathematics, Dec. 2017
- *Paul J. Sally, Jr. Midwest Representation Theory Conference*, October 2017, Purdue University (funded participant)
- *Representation Theory of  $p$ -adic Groups Conference and Workshop*, July 2017 Indian Institute of Science Education and Research, Pune, India (funded participant)
- *Graduate Summer School on Automorphic Forms and the Langlands Program*, July-August 2017, Mathematical Sciences Research Institute, Berkeley (funded participant)

- *re:boot number theory*, June 2017, Duke University (funded participant)
- *Arizona Winter School: Perfectoid Spaces*, March 2017, University of Arizona, Ana Caraiani's Study Group (funded participant)
- *Midwest Women in Mathematics Symposium*, Indiana University - Indianapolis, February 2017 (funded participant)
- *Paul J. Sally, Jr. Midwest Representation Theory Conference*, October 2016, University of Iowa (funded participant)
- *Graduate Summer School on Character and Representation Theory*, July 2016, Mathematical Sciences Research Institute, Berkley (funded participant)
- *Pacific Institute for the Mathematical Sciences*, June 2016, University of Calgary, Graduate Summer School on Abelian Varieties (funded participant)
- *30th Automorphic Forms Workshop*, March 2016, Wake Forest University (funded participant)
- *Arizona Winter School: Analytic Methods in Arithmetic Geometry*, March 2016, University of Arizona, Andrew Sutherland's project group (funded participant)
- *Joint Mathematics Meeting*, January 2016, Seattle, WA
- *Paul J. Sally, Jr. Midwest Representation Theory Conference*, October 2015, University of Missouri
- *Arizona Winter School: Arithmetic Statistics*, March 2014, University of Arizona, Chantel David's study group, (funded participant)
- *Midwest Number Theory Conference for Graduate Students and Recent PhDs*, University of Illinois at Urbana-Champaign, 2012, 2014, University of Illinois at Chicago, 2015 (funded participant)
- *KUMUNU*, 2014, 2015, University of Missouri
- *MAA Spring Regional Meeting*, April 2012, Fremont Nebraska
- *Workshop on Hopf Algebras and Galois Scaffolds*, May 2011, University of Nebraska at Omaha
- *American Mathematical Society Fall Central Sectional Meeting*, April 2011 University of Nebraska
- *MathFest and Pi Mu Epsilon Conference*, August 2010, University of Pittsburgh (funded)
- *Nebraska Conference for Undergraduate Women in Mathematics*, 2008, 2010, University of Nebraska (funded participant)
- *MathFest*, August 2008, University of Wisconsin (funded participant)

## Major Teaching Experiences

### Oklahoma State University

- MATH 6723 Algebraic Number Theory, Fall 2024
- MATH 4713/5713 Number Theory, Fall 2023
- MATH 2890, Honors Calculus in Calculus II (1 credit hour add-on course), Fall 2023
- MATH 4453/5453 Theory of Mathematical Interest, Spring 2023, Spring 2024, Spring 2025
- MATH 2153 Calculus II (2 sections) Fall 2022: (1 Section) Fall 2023: (1 Section) Fall 2024

### University of Toronto

- Instructor, Calculus I, Fall 2018, Fall 2019
- Instructor, Calculus II, Spring 2020

### University of Missouri

- Instructor, Theory of Numbers, Spring 2018
- Teaching Assistant, Calculus II, Fall 2017
- Instructor, Calculus for Social Sciences I, Fall 2015, Spring 2016
- Instructor, Trigonometry, Fall 2015
- Instructor, Finite Math, Spring 2015
- Instructor, Summer Transition Program for underrepresented minorities, Summer 2015
- Instructor, College Algebra Fall 2013 - Fall 2014

### University of Nebraska at Omaha

- Instructor, Calculus 1, Fall 2016 - Spring 2017

- Instructor, Theory of Interest, Fall 2016
- Instructor, Developmental Math Courses through MCC, Fall 2011 - Spring 2013
- Trio Project Achieve Tutor in Mathematics, 2008 - 2010

### Service and Outreach Activities

- Referee for the following research journals
  - Annals of Mathematics, Canadian Journal of Math, Journal of Number Theory, Journal de Théorie des Nombres de Bordeaux, Research in Number Theory
- Reviewer for Mathematical Reviews, 2023 - present
- Organizer of Conferences and Seminars
  - Co-organizer (with L. Beneish) of an AMS Fall Central Sectional Meeting Special Session *L- functions and Automorphic Forms* in San Antonio TX, September 2024.
  - Co-organizer (with J. Cohen, K. Klinger-Logan, L. Yang) of the *36th Automorphic Forms Workshop (AFW)*, Stillwater OK, May 2024
  - Co-organizer (with M. Asgari, L. Beneish, M. Fox, K. Martin, A. Pitale, O. Richter, and A. Shepler) of the conference series *Texas-Oklahoma Representations and Automorphic Forms (TORA)*.
  - Co-organizer (with M. Asgari and M. Fox) of TORA XIV, OSU, Spring 2025.
  - Co-organizer (with M. Espinosa-Lara, D. Kundu, and T.A. Wong) of the *Beyond Endoscopy Mini Conference*, the Fields Institute, April 2023.
  - Co-organizer (with K. Choiy and R. Schmidt) of the AMS Spring Western Sectional Meeting on *Recent Advances in the Langlands Program*, Denver, CO, May 2022.
  - Co-organizer (with L. Barchini) of the Lie Groups seminar, Oklahoma State University (Fall 2022- present).
  - Organizer of Number/Representation Theory seminar, University of Toronto (Fall 2021 - Spring 2022)
  - Organizer of a weekly working seminar with Prof. Arthur's Ph.D students, University of Toronto. (Fall 2019 -present.)
  - Community of Practice (University of Toronto), Member (2018-2019), Organizer (2019-present). This is a seminar focused on peer mentorship and best practices for active learning in large classes.
  - Representation Theory and Number Theory Seminar (MU) Co-organizer (Spring 2016) Organizer (Fall 2017)
  - Organized on campus showing of Hidden Figures movie and discussion panel for the MU community to encourage underrepresented minorities in STEM majors (March 2017).
- Outreach to the Community
  - Speaker for the OSU High School Math Day (Fall 2023)
  - Guest speaker for the High School Classification in Mathematics Course (summer program) at the University of Toronto (June 2020)
  - Developed and taught a cryptography course to the Girls in STEM program at the University of Toronto (October 2018, March 2022)
  - Tutored at risk high school students in mathematics through the MU Math Department (2015 - 2018)
  - Developed and taught a Cryptography course to under-represented minority youth during Eureka! Girls Camp, University of Nebraska at Omaha, (June, 2014).
- Faculty advisor for the OSU student chapter of the Association for Women in Mathematics (AWM) Spring (2023 - present)
  - Our aim for the Oklahoma State University Student Chapter of the AWM is to support and build a community for females and other underrepresented groups participating in the mathematical sciences. We organize a range of events that are open to the entire OSU community. This includes undergraduate and graduate students along with faculty and staff.
  - Accompany undergraduate students to and participate in the Nebraska Conference for Undergraduate Women in Math (NCUWM) at the University of Nebraska-Lincoln.
  - Organizer of the OSU annual Sonia Kovalevsky Day Math Workshop. The objective of the event is to increase girls' interest in mathematics in grades 6-9, assist them in the transition between middle school and high school mathematics, and encourage them to

pursue careers in STEM disciplines. Participants engage in hands-on activities through a series of workshops.

- AWM officers and myself also attend Women of Steam Conference at the OKC Science Museum. At this annual event, we host a table with hands on activities for students to engage in and encourage participants to consider a career in Math.
- OSU Committee Work: Mathematics Department
  - Undergraduate Committee (2024-Present)
  - Personnel Committee (2023-2024)
- Arizona Winter School
  - Pre-Arizona Winter School (PAWS) Lecturer: *Symmetries of root systems*, Fall 2024
  - Problem Session Leader for 2022: *Automorphic Forms Beyond  $GL(2)$*

### **Computer Skills**

- Experience with Sage, Magma, Maple, and Java

### **Professional Memberships**

- American Mathematical Society (AMS)
- Association for Women in Mathematics (AWM)
- Canadian Mathematical Society (CMS)